

PROJECT NUMBER: 1758
PROJECT TITLE: Tobacco Cell Wall Research
PROJECT LEADER: Gordon H. Bokelman
PERIOD COVERED: November, 1985

I. TOBACCO ADHESIVES (Howard Sun, Bill Ryan, Gordon Bokelman, Sue Wrenn and Ray Dawson)

A literature search conducted by Sue Wrenn indicates that commercial licorice may contain substantial quantities of starch, simple sugars, gums, and even cellulose and lignin, in addition to glycyrrhizin. It appears that the composition of licorice is variable and its components are not well characterized. In order to better understand how tobacco binders based on licorice and pectin function, we intend to characterize commercial samples of block and spray-dried licorice by a modified version of our standard fractionation procedure (Bokelman, Gordon H., William S. Ryan, Jr. and Elisabeth T. Oakley, "Fractionation of Bright Tobacco," J. Agric. Food Chem. 1983, 31, 897-901).

Large scale chromatography of the di-sodium EDTA extract of flue-cured E-55 lamina using a QAE-Sephadex A-50 column yielded several grams of tobacco pectin. A portion of this sample was saponified to produce a de-esterified pectin. Both of these samples were submitted to Dr. George C. Ruben at Dartmouth College for the study of tobacco pectin gels using transmission electron microscopy.

Ray Dawson has suggested that we consider the use of "non-fractionated vegetable materials as combined adhesive, stiffener and humectant" for low-density rod cigarettes. His suggestion is based in part on work performed at Lancaster Laboratories on the stabilization of alfalfa hay pellets formed by compression. This stabilization involved producing a binder by enzymatic degradation of endogenous starch (see U.S. Patent No. 3,420,671). As a partial implementation of Dawson's suggestion, we have solicited samples of barley, malt and spent malt from Bill Herwig at Miller Brewing so that we may examine their starch contents.

II. CIGARETTE LOOSE ENDS (Bill Ryan)

Cigarettes were obtained from Peter Martin that had been produced by the Molins Company in such a manner as to reduce loose ends. Light microscopy suggested that the ends of these cigarettes may have been treated with a viscous solution that dried to form an amorphous coating. After storage under conditions of high humidity, it was soon apparent that the strands of tobacco at the end of the rod were no longer bound to one another. The first 5mm of tobacco obtained from the ends of several of these cigarettes are now being analyzed for sugar content.

III. RECONSTITUTED TOBACCO STUDIES (Bill Ryan)

More progress has been made in a study to examine the chemical compositions of commercial samples of RCB, RL and RL baseweb. The following additional results (reported on a percentage dry weight basis) have been obtained.

2000629683

<u>Component</u>	<u>RCB</u>	<u>RLTC</u>	<u>RL-BW</u>
Pectin	13.2	15.2	27.7
Starch	0.82	<0.45	0.61
Lactic Acid	<0.7	1.1	<0.7
Oxalic Acid	1.8	1.4	2.3
Malic Acid	3.5	4.8	<0.7
Citric Acid	1.4	1.0	<0.7
Total Reducing Sugars	<2.4	3.9	<2.3
Total Alkaloids	0.76	0.78	<0.4
Nitrate Nitrogen	0.32	0.42	<0.05
Soluble Ammonia	2.46	0.13	<0.12
Potassium	3.00	5.23	0.88
Sodium	0.05	0.07	<0.029
Calcium	2.49	2.50	2.71
Magnesium	0.53	0.58	0.29
Phosphorus	1.92	<0.11	<0.12
Silicon	1.88	<0.29	0.32
Chloride	0.49	1.21	<0.12
Sulfate	1.06	1.14	0.35
Total Ash	21.2	18.4	10.0

The relatively high value for lactic acid in the RLTC suggests that at least some fermentation has occurred. The presence of diammonium phosphate in the RCB is indicated by the high values for soluble ammonia and phosphorus. Likewise, the high silicon value is indicative of the relatively high sand content of RCB. The RLTC has much higher values for potassium and chloride than does RCB, which is indicative of the stem content of the starting material for RLTC. Interestingly, all three materials have comparable calcium levels although they vary significantly in their pectin contents.

IV. MISCELLANEOUS

1. Memo to Dr. Richard H. Cox from Gordon H. Bokelman, "Compositional Determination of Binary Lamina-Stem Mixtures," dated October 31, 1985.
2. Memo to Dr. Richard H. Cox from Gordon H. Bokelman, "Priority Research Projects," dated November 1, 1985.
3. Memo to Dr. Richard H. Cox from Gordon H. Bokelman, "Acquisition of an HP 5970 B Mass Selective Detector," dated November 6, 1985.
4. Ruben, George C. and Gordon H. Bokelman, "New Evidence Suggests that the Cellulose Elementary Fibril is Triple Stranded and Wound Helicoidally," poster presentation at the Annual Meeting, American Society for Cell Biology, Boston, Mass., November 10-14, 1985.

Gordon H. Bokelman

2000829684